Rural Electrification Administration
Telephone Engineering and Construction Manual

Section 116 Issue No. 1 Addendum No. 1 March 1966

PLANT ENGINEERING AND RECORD SYSTEM

PURPOSE:

The purpose of this addendum is to set forth suggested specifications for paper with satisfactory characteristics to be used in the commercial printing of the functional record forms introduced in Section 116, Issue No. 1 dated December 1965.

ADDITIONS:

The following standards apply to the blank forms shown in Exhibits A, B, C, and D in Section 116, Issue No. 1, December 1965.

REQUIREMENTS:

INDEX PAPER 25 PERCENT RAG

COLOR - BUFF - OPTIONAL

SUBSTANCE - (BASIS 25-1/2 x 30-1/2 IN.) - 220 POUNDS THICKNESS - (APPROXIMATELY) - SINGLE SHEET, 0.0085 INCH;

1000 SHEETS, 8.5 INCHES

OPACITY - TEXT, ETC., E; HALF TONES, SOLIDS, ETC., E.

INK - GREEN - OPTIONAL

USAGE:

The four forms referred to above are to be $8\frac{1}{2}$ " x 14" outside measurements, and are proposed only as the office master copies. It is intended that additional copies (work copies) be reproduced from the periodically updated master copies on local office reproduction machines.

PLANT ENGINEERING AND RECORD SYSTEM

CONTENTS

- 1. GENERAL
- 2. SCOPE
- 3. THE NUMBERING SYSTEM
- 4. ENGINEERING APPLICATION
- 5. CENTRAL OFFICE FACILITY RECORD
- 6. LINE EQUIPMENT RECORD

EXHIBITS A, B, C, D, E EXAMPLE: Pages 1 - 12

1. GENERAL

1.1 This section is to provide REA borrowers, consulting engineers, contractors, and other interested parties with information for use in the design, construction, and operation of REA borrowers' telephone systems. It discusses, in particular, considerations in the use of a flexible numbering system for all outside plant facilities and the adoption of a new concept in plant records prepared in a complete packet, designed particularly for circuit-by-circuit engineering of buried or aerial plant, and which is applicable to all types of outside plant facilities.

2. SCOPE

- 2.1 The intent is to provide engineering methods and a recording system having broad capabilities as follows:
- 2.11 Facilitate circuit-by-circuit design and cable pair allocation during the interval between partial completion of the detail maps, staking sheets, cable schematics, and actual cutover of the exchange or portion of an exchange.
- 2.12 Provide flexibility of plant by means of advance engineering allocation of cable pairs (designated by home count assignments -- see TE & CM 628, "Cable Plant Layout.")
- 2.13 Insure that transmission design criteria relative to bridge tap length, outer end sections, loading, etc., are met and controlled during staking, construction, at cutover, and throughout the subsequent operation of the system.
- 2.14 Provide a method keyed to all establishments in the exchange area rather than being limited to the existing, signed, and chosen A, B, C, potential. It will furnish means whereby subscriber development and resulting future plant requirements may be accurately determined with a minimum of plant reinforcement and rearrangement. Any establishment may be readily located for existing or future service needs.
- 2.15 Provide a sequential outside plant numbering system directly related to establishment location with respect to a pedestal, terminal, or pole, and route mile distance from the central office.
- 2.16 Provide a procedure that is not directly related to one type of plant, i.e., aerial, buried, underground, open wire, etc., and can be used on any system regardless of size. It will list essential data for every subscriber loop and interoffice trunk in the system.
- 2.17 To establish a well defined and workable method that may be effectively used during construction of the system to direct splicing, termination of pairs, installation of drops, loading, pair assignment, home count allocation, control of line fill, and to substantially reduce the requirements for using staking sheets and cable schematics for these activities. It will also provide a record of dead pairs, cut pairs and denote the specific function of every exchange loop.

PEA TE & CM-116

- Provide working records (inside and outside plant facilities) that may be reproduced on local machines (81 x 14") for functional use by field personnel, especially those not operating directly out of a main control center. The recording capacity per page over existing
- . THE NUMBERING SYSTEM
- The rapid development of buried plant and its associated electronic components has created a need to update the methods employed for outside plant identification and location. The practice of attempting to locate a buried plant pedestal by identifying it as so near or so far from some rival house or barn is antiquated. A numbering system is needed where the permanent plant location is fixed, is controlling, and the establishment is related to the known pedestal location. The numbering system presented herein meets the following objectives:
- 1. Is adaptable to all types of outside plant facilities, i.e., manholes, pedestals, aerial
- b. Has a minimum and fixed number of characters.
- 3. Fequires a minimum of changes for plant expansion or rearrangements.
- 2. Provides accurate location information for operations and maintenance personnel.
- e. Is easy to administer and record.
- The numbering system consists of four characters: (1) a letter for cable, (2) a numeral for control point, (3) a letter for route, and (4) a number for manhole, pedestal, terminal, or pole. Pedestals, poles, etc., between two control points always count consecutively 1, 2, 3,



- 3.21 Space 1 is always a letter. Cables from the central office are identified A, B, C, etc., generally from a point north, clockwise around the central office.
- 3.22 Space 2 is always one or two numerals (1-99) except those facility identifications between the central office and the first control point which will have a dash (A-Al) in this second space. Control points and load points are the exact same locations; the control points are established and carried throughout a cable even if no loading is required. Control points are also established on open wire leads. The spacing is made to coincide with the choice of loading system, i.e., D66 = 4.5 kf, H88 = 6.0 kf, etc., or if necessary a combination of loading systems.
- 3.23 Space 3 is always a letter A, B, C, etc. Laterals not containing a control point are treated numerically as a part of the main route. When laterals extend beyond a control point, they are assigned the next available route letter designation.
- 3.24 Space 4 is always one or two numerals (1-99) except when the pedestal is a control point; then this space will have a dash (AlA-). This dash can only occur when there is a numeral in space 2.
- 3.3 Since loading system sections are 4,500 feet (or 6,000 feet in length in older patterns), it may be assumed, for operational location purposes, that control points occur at roughly one mile intervals (5,280 feet); i.e., a maintenance man looking for pedestal ASAl would know it was cable A, 5th control point from central office (approximately 4.5 miles), route A, and the
- 3.4 The numbering system will accommodate 26 separate cables from one central office; 99 control points on any given route; 26 separate routes on a given cable; and 99 pedestals, terminals, or poles between any two control points along the route. With this flexibility and potential, it

- 3.5 The identifying characters used on pedestals and terminals should be at least one-inch, bright colored, weatherproof, and on a dark background. The top six-inch portion of control point housings may be easy identification. Control point pedestals should be kept clear of undergrowth and be easily seen from the roadway.
 - 3.6 The numbering system, when supported by a simple directional plant diagram (See Example Page 1), provides ready location for any desired pedestal, pole, etc., in an exchange.

4. ENGINEERING APPLICATION

- 4.01 The Outside Plant Facility Record (OPFR) (Exhibit B) is presented for use to fill the needs set forth in paragraph 2. After the initial grouping of establishments to subscriber lines in the design procedure, the cable sizing and reduction points are tentatively located and posted on the ACD maps and/or detail maps. This data is made firm as staking progresses, along with the exact location of load (control) points and sectional pedestals. It is at this time period that the final circuit-by-circuit design engineering and the pair-by-pair allocations should be scarted and initial use of the Outside Plant Facility Record employed.
- 4.02 Where the initial engineering phases of cable loading are done on the ACD or detail maps, the pedestal numbering system is applied, and when stabilized during staking, it is entered on the Outside Plant Facility Record. The numbering is applied to manholes, pedestals, terminals, and certain poles. On long sections of open wire pole line, it generally is necessary to enter only those pole numbers at control points and where laterals or drops are separated.
- 4.03 The first step is to study the general layout of each cable leaving the central office.

 Keep in mind that the Outside Plant Facility Record is arranged to accommodate up to 50 cable pairs or any fraction thereof. Cables are therefore viewed in 50-pair segments within their distribution area (from the pedestal where a 50-pair cable emerges from a larger cable to the out or field end of all loops within that 50-pair count). Any manholes, pedestals, terminals, or poles between the reduction point pedestal and the central office that have loading or other plant components relating directly to the 50-pair count being studied must also be considered, and they are necessarily shown on the Outside Plant Facility Record. (Example Pages 4 and 6.)
- 4.04 When the pedestal numbering has become firm, all establishment numbers are related to their respective pedestal, etc., and listed on the Outside Plant Facility Record. The plant facility layout portion of the OPFR is then prepared. Laterals are shown as leaving the main route either right or left with back to central office. Reduction points, facility type, size, gauge and pair counts are shown. A space is left following the "pulloff" of a lateral and another space left beyond the end of the lateral. This is to facilitate the entries on the lower portion of the sheet. An arrow is drawn in the open space to indicate if the lateral is right or left from main route.
- 4.05 The 50-pair cable count, or fraction thereof, is entered in the cable pair column along the left side of the sheet. The control points are drawn in. It is essential to know exactly what cable pairs are to be loaded at a given load (control) point. The symbols are then filled in with pencil to represent loaded cable pairs.
- 4.06 Distance is not relative to the Outside Plant Facility Record, and is only determined by the number of pedestals, etc., recorded. The pedestal-to-pedestal sectional footages and the accumulated control point kilofeet are not entered until the "as built" measurements are available from the staking sheets.
- 4.07 The "Term. Type" column directly under the pedestal numbers may be MP pole, HA, etc., for terminal type on aerial cable and BD2, etc., for where two pedestal housings are required for space, they are shown as 2BD

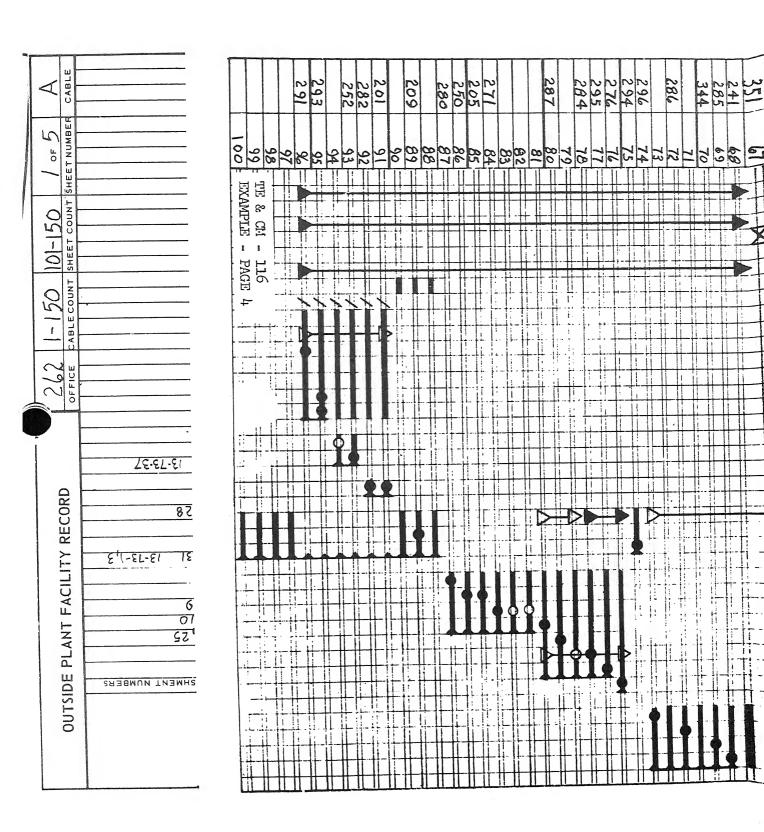
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- 4.09 For multiparty exchanges, the line equipment number is controlling, and at time of final assignment is posted in the column "TEL. OR CIRCUIT NUMBER." For one-party exchanges, the four digit connector terminal number is controlling and is entered in this column.
- 4.15 Main frame bridging of cable pairs is posted to the appropriate cable pair on the Legend and Notes sheets. Load coil size and other similar information not covered by symbol on the Cutside Plant Facility Record is also posted on the Legend and Notes sheet.
- 5. CENTRAL OFFICE FACILITY RECORD (EXAMPLE Sheets 9 and 10)
- The central office facility record is designed to replace the line and station card, and is sized to be an integral part of the overall exchange packet. The information contained thereon is keyed to the connector terminal numbers. The sheet is printed on both sides thereby providing space for recording 200 connector terminal assignments on each sheet. The size is
- 5.2 For operational purposes, where a telephone number (connector terminal number) is provided, such as on a trouble ticket, the cross reference is from connector terminal number to cable
- 5-3 The column headed "Station Apparatus" is also used for recording special equipment such as transmitting amplifiers, key sets (wiring plans), extension bells, etc.
- 5.4 The trouble record portion of the present line and station card is replaced by filing the trouble tickets as set forth in TOM Section 1238, "Trouble Reporting.
- 5.5 In making the initial and subsequent connector terminal assignments, care should be taken to comply with the traffic considerations in TE & CM Section 221, "Assignment of Line and Station Numbers," (Terminal Per Station Systems).
- ϵ . LINE EQUIPMENT RECORD (EXAMPLE Sheets l_{\perp} and l_{2})
- 5.1 This form is cross-referenced to the Outside Plant Facility Record through the connector terminal numbers. The class of service does not appear elsewhere on these record forms.
- 6.2 The bunching block record is made a part of this form. The numbering system for bunching blocks differs with the type and make of C.O.E. and, therefore, must be obtained by the engineer from the manufacturers.
- 6.3 Where all one-party service is offered, the bunching block record would not be required; the line equipment record would become only a record of line equipment assigned and available, and the connector terminal numbers on the central office facility record would become all con-

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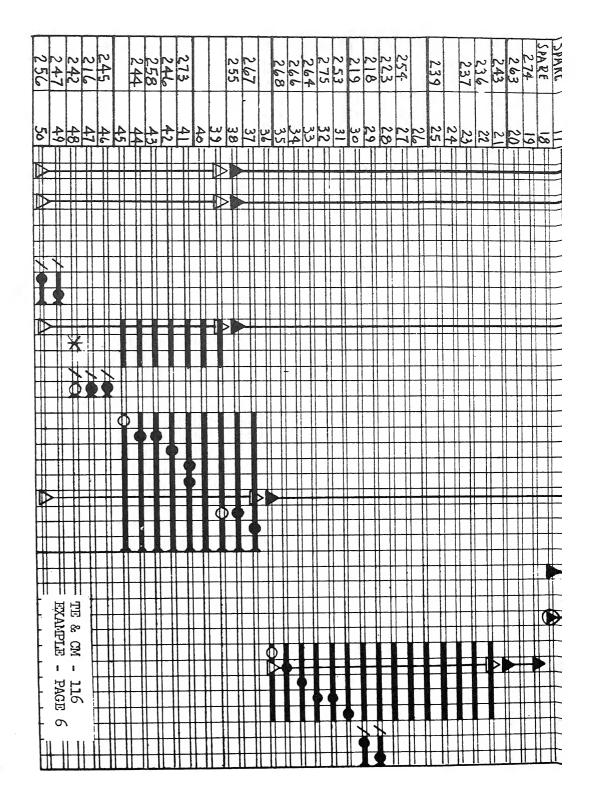
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NOTE 4. USE ABOVE COLOR CODE IN NUMERICAL ORDER FOR ALL TWENTY-FIVE DAIR COLOR GROUPS. 46-46 ESTABLISHMENT NUMBERS NUMBERING SYSTEM SUNS HIBER NUMBER BLC. K NUMBER MAT NUMBER SECTION PEDESTAL OR TERMINAL (NUMBER) ROUTE (LETTER) _ CONTROL POINT (NUMBER). CABLE (LETTER) DEAD) NOTE: Friconcies are some typical entire for the sheet However 100 * K' LC/000 STUR SLAYE MMOMM GREN DEAD PAIRS CARRIER FILTER IDENTIFYING LOADING AT CONTROL POINT CONTROL POINT PAIR CUT DEAD TEMPORARY PAIR ASSIGNMENT ASSIGNED PAIR ALLOCATED PAIR CABLE PAIR - IN ITS USAGE AREA whate ? 10 63 12 sile un GREEN STANDARD GROUP COLOR CODE - CABLE AND MPD WIRE EUR THISTORY 12 BLACK BLUM 16 VELLOW BROWN
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